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EXAMINER
LAVARIAS, ARNEL C

ART UNIT	PAPER NUMBER
2872	

DATE MAILED: 07/11/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/869,351	LACOUR ET AL.	
	Examin r	Art Unit	
	Arnel C. Lavarias	2872	

-- The MAILING DATE of this communication appears on th cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 May 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

1. The amendments to the specification of the disclosure in Paper No. 10, dated 5/12/03, are acknowledged and accepted. In view of these amendments, the objections to the specification in Paper No. 8, dated 12/9/02, are respectfully withdrawn.

2. The amendments to Claims 1-17 in Paper No. 10, dated 5/12/03, are acknowledged and accepted. In view of these amendments, the objections to Claim 1, and the rejections of Claims 1, 5, 7, 13, and 15 under 35 U.S.C. 112, 2nd paragraph, are respectfully withdrawn.

3. The addition of Claim 18 in Paper No. 18, dated 5/12/03, is acknowledged and accepted.

Response to Arguments

4. The Applicants argue that, with respect to newly amended Claim 1, Singh et al. in view of Koester et al. fails to teach or reasonably suggest the diaphragm having an aperture of a fixed diameter, or the a means for displacing the object within a plane after each pulse of the laser source. After review of the Singh et al. and Koester et al. reference, the Examiner agrees, and respectfully withdraws the rejections to Claims 1-17 in Paper No. 8, dated 12/9/02.

5. The Applicants argue that, with respect to newly amended Claim 1, Singh et al. in view of Koester et al. fails to teach or reasonably suggest the means for analyzing a light

radiation spectrum emitted from the plasma being disposed adjacent to the plasma. The Examiner disagrees. As disclosed in, for example, Figure 1 of Singh et al., the means for analyzing a light radiation, i.e. 10 and 11 of Figure 1 of Singh et al., are located nearby the sample cell and carbon rod where the plasma is generated.

6. Claims 1-18 are rejected as follows.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1, 7, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Singh et al. (U.S. Patent No. 5751416) in view of Koester et al. (U.S. Patent No. 3783874) and Elings et al. (U.S. Patent No. 4407964).

Regarding Claims 1 and 18, Singh et al. discloses an elementary analysis device by optical emission spectrometry on laser-produced plasma, comprising a pulsed laser source (See 1 in Figure 1), a second optical means (See 5 in Figure 1) and an object to be analyzed (See 6 in Figure 1). Singh et al. also discloses a means disposed adjacent to the plasma (See 11 in Figure 1; see Intensified Diode Array Detector and Spectrograph) for analyzing a light radiation spectrum emitted by the plasma, and a means (See 11 in Figure 1; Computer) of determining the elementary composition of the object based from this spectral analysis (See col. 7, lines 17-27). Singh et al. lacks a diaphragm having an

aperture of a fixed diameter, usable for selecting part of the laser beam emitted by the source, and delimiting the shape of the impact of the laser beam on an object to be analyzed, the laser beam not being focused in the plane of the diaphragm. Singh et al. additionally lacks a first optical means of projecting the image of the diaphragm to infinity, and wherein the second optical means receives the image of the diaphragm projected to infinity by the first optical means and focusing it onto the object to be analyzed. Singh et al. also lacks the image of the diaphragm focused onto the object being equal to the required dimension on this object and wherein the focal point of the laser beam, after crossing through the diaphragm and the first and second optical means, is outside the image plane of the diaphragm. Finally, Singh et al. lacks a means for displacing the object within a plane after each pulse of the laser source. However, Koester et al. teaches a diaphragm (See 28 in Figure 1) usable for selecting part of the laser beam emitted by the source, and delimiting the shape of the impact of the laser beam on an object to be analyzed, the laser beam not being focused in the plane of the diaphragm (See Figure 1). Additionally, Koester et al. teaches a first optical means (See 106 in Figure 1) of projecting the image of the diaphragm to infinity. Neither Singh et al. nor Koester et al. separately disclose the second optical means receiving the image of the diaphragm projected to infinity by the first optical means and focusing it onto the object to be analyzed, wherein the focal point of the laser beam, after crossing through the diaphragm and the first and second optical means, is outside the image plane of the diaphragm and the image of the diaphragm focused onto the object being equal to the required dimension on this object. However, the combination as disclosed above

inherently has a second optical means (See 5 in Figure 1 of Singh et al.) designed to receive the image of the diaphragm (See 28 of Figure 1 in Koester et al.) and focusing the diaphragm on the object to be analyzed to produce plasma on the surface of the object (See col. 5, lines 23-29 of Singh et al.), wherein the focal point of the laser beam, after crossing through the diaphragm and the first and second optical means, is outside the image plane of the diaphragm (the beam is focused at the object to produce a plasma), and wherein the image of the diaphragm focused on the object is equal to the required dimension on the object. Additionally, it is extremely well known in the art of optical spectroscopy to utilize an aperture/diaphragm/pinhole that has either a fixed or variable diameter opening in the beam path (thus altering the shape and size of the beam cross-section passing through the aperture/diaphragm/pinhole) and also to provide translation and/or rotational movement of the sample object. For example, Elings et al. teaches an optical spectroscopic setup for performing fluorescence measurements (See Figure 4; col. 5, lines 3-21), wherein a fixed diameter aperture (See 60 in Figure 4) is used in the path of the input laser beam (See 58 in Figure 4). Additionally, Elings et al. teaches that the sample under test (See 62 in Figure 4) may be translated within a plane during illumination with the source laser. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the light emitted from the laser of Singh et al. to include a fixed diameter diaphragm, a first optical means, and a means for displacing the object within a plane as taught by Koester et al. and Elings et al., for the purpose of 1) adjusting the energy/intensity distribution of the laser on the object and 2) allowing different locations on the object to be sampled.

Regarding Claim 7, Singh et al. discloses wherein the second optical means are refractive optical means comprising a microscope objective (See 5 in Figure 1). Singh et al. lacks wherein the diaphragm comprises a circular aperture that selects the central part of the laser beam output from the laser source, and the first optical means are refractive optical means. Koester et al. discloses wherein the diaphragm (See 28 in Figure 1) comprises a circular aperture that selects the central part of the laser beam output from the laser source (See col. 4, lines 13-15; Figure 1), and the first optical means are refractive optical means (See Figure 1). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the light emitted from the laser of Singh et al. to include the diaphragm as taught by Koester et al. and to include a refractive first optical means as taught by Koester et al. to obtain a more uniform light from the laser and to reduce cost, respectively.

9. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Singh et al. in view of Koester et al. and Elings et al. as applied to Claim 1 above, and further in view of Lehureau (U.S. Patent No. 5657304).

Singh et al. in view of Koester et al. and Elings et al. discloses the invention, except for the second means having a numerical aperture equal to approximately 0.1 or greater. However, Lehureau teaches a numerical aperture greater than 0.1 (See col. 1, lines 47-50). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the second optical means of Singh et al. in view of Koester et al. and Elings et al. to include a numerical aperture as taught by Lehureau to reduce mechanical failures and provide a very small spot size for the input light beam.

10. Claims 3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Singh et al. in view of Koester et al. and Elings et al. as applied to Claim 1 above, and further in view of Sabsabi et al (U.S. Patent No. 6008897 or Sabsabi '897).

Regard Claim 3, Singh et al. in view of Koester et al. and Elings et al. discloses the invention, except for the impact size of the laser beam on the object being greater than or equal to 1 μm. However, Sabsabi '897 teaches the impact size of the laser beam on the object being greater than 1 μm (See col. 7, lines 5-6). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the impact size of the laser beam of Singh et al. in view of Koester et al. and Elings et al. to be greater than 1 μm as taught by Sabsabi '897 to obtain the correct energy densities in the beam to form a plasma.

Regarding Claim 5, Singh et al. in view of Koester et al. and Elings et al. discloses the invention, except for the pulsed laser source emitting ultraviolet light. However, Sabsabi '897 teaches the source emitting ultraviolet light (See col. 7, lines 10-11). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the pulsed laser source of Singh et al. in view of Koester et al. and Elings et al. to be ultraviolet as taught by Sabsabi '897 to effectively penetrate for a longer period the developing plasma and reach the target surface for maximum laser ablation (See col. 6, lines 51-61).

11. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Singh et al. in view of Koester et al. and Elings et al. as applied to Claim 1 above, and further in view of Sabsabi et al. (U.S. Patent No. 5781289 or Sabsabi '289).

Singh et al. in view of Koester et al. and Elings et al. discloses the invention, except for the displacement frequency of the object between two laser pulses of the source is greater than or equal to 15 Hz. However, Sabsabi '289 teaches the displacement frequency of the object between two laser pulses of the source being greater than 15 Hz (See col. 7, lines 46-63). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the displacement frequency of the object as disclosed by Singh et al. in view of Koester et al. and Elings et al. to be greater than 15 Hz as taught by Sabsabi '289 to increase the number of samples that are measured.

12. Claims 6 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Singh et al. in view of Koester et al. and Elings et al. as applied to Claims 1 and 7 above, and further in view of Magee et al. (U.S. Patent No. 4758533).

Singh et al. in view of Koester et al. and Elings et al. discloses the invention as set forth above, except for the relative variation of energy between laser pulses does not exceed 5%. However, Magee et al. discloses the relative variation of energy between laser pulses not exceeding 5% (See col. 7, lines 63-65). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the laser of Singh et al. in view of Koester et al. and Elings et al. to have the energy variation as taught by Magee et al. to have a more consistent quality of analysis.

13. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Singh et al. in view of Koester et al. and Elings et al. as applied to Claim 1 above, and further in view of Ferguson et al. (U.S. Patent No. 5780806).

Singh et al. in view of Koester et al. and Elings et al. discloses the invention as set forth above, except for the first and second optical means being anti-reflection treated for reflections at the wavelength of the light emitted by the laser source. However, Ferguson et al. teaches making lenses with anti-reflection coatings, particularly for applications requiring high pulsed laser power density (See col. 6, line 38-col. 7, line 4). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make the first and second optical means of Singh et al. in view of Koester et al. and Elings et al. anti-reflective at the wavelength of the laser to minimize reflection and to maximize the laser's throughput.

14. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Singh et al. in view of Koester et al. and Elings et al. as applied to Claim 1 above, and further in view of Andre et al. (U.S. Patent No. 5583634).

Singh et al. in view of Koester et al. and Elings et al. discloses the invention as set forth above, except for a means for blowing a gas jet onto the object. However, Andre et al. teaches a means for blowing a gas jet onto the object (See col. 2, lines 55-67). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the elementary analysis device of Singh et al. in view of Koester et al. and Elings et al. to include a means for blowing a gas jet onto the object as taught by Andre et al. to create more favorable conditions for spectral analysis (See col. 2, lines 60-62).

15. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Singh et al. in view of Koester et al. and Elings et al. as applied to Claim 1 above, and further in view of Svanberg et al. (U.S. Patent No. 4786813).

Singh et al. in view of Koester et al. and Elings et al. discloses the invention as set forth above. Additionally, Singh et al. in view of Koester et al. and Elings et al. discloses a mirror (See 4 of Figure 1 of Singh et al.) reflecting at the wavelength of the laser source and transparent at other wavelengths (See col. 6, lines 42-47 of Singh et al.), and the mirror being placed on the light path between the first and second optical means and designed to reflect almost the entire laser beam to the second optical means and to transmit an image of the object to the observation means (See 10 in Figure 1 of Singh et al.). Singh et al. in view of Koester et al. and Elings et al. lacks a means for observing the object, so that the object can be placed in the image plane of the diaphragm. However, Svanberg et al. teaches a means for observing the object (See Figure 1; col. 2, lines 57-68) in the image plane (See 4 in Figure 1). In the combination of Singh et al. in view of Koester et al. and Elings et al., and further in view of Svanberg et al., the image plane of the diaphragm would be in the image plane (See 4 in Figure 1). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Singh et al. in view of Koester et al. and Elings et al. to include a means for observing the object to ensure correct placement of the object for analysis.

16. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Singh et al. in view of Koester et al. and Elings et al., and further in view of Lehureau, as applied to Claims 1-2 above, and further in view of Sabsabi '897.

Singh et al. in view of Koester et al. and Elings et al., and further in view of Lehureau disclose the invention as set forth above in Claims 1-2, except for the impact size of the laser beam on the object is greater than or equal to 1 μm. However, Sabsabi '897 teaches the impact size of the laser beam on the object being greater than 1 μm (See col. 7, lines 5-6). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the impact size of the laser beam of Singh et al. in view of Koester et al. and Elings et al., and further in view of Lehureau, to be greater than 1 μm as taught by Sabsabi '897 to obtain the correct energy densities in the beam to form a plasma.

17. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Singh et al. in view of Koester et al. and Elings et al., and further in view of Sabsabi '897, as applied to Claims 1 and 3 above, and further in view of Sabsabi '289.

Singh et al. in view of Koester et al. and Elings et al., and further in view of Sabsabi '897, disclose the invention as set forth above in Claims 1 and 3, except for the displacement frequency of the object between two laser pulses of the source is greater than or equal to 15 Hz. However, Sabsabi '289 teaches the displacement frequency of the object between two laser pulses of the source being greater than 15 Hz (See col. 7, lines 46-63). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the displacement frequency of the object

as disclosed by Singh et al. in view of Koester et al. and Elings et al., and further in view of Sabsabi '897, to be greater than 15 Hz as taught by Sabsabi '289 to increase the number of samples that are measured.

18. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Singh et al. in view of Koester et al. and Elings et al., and further in view of Sabsabi '289, as applied to Claims 1 and 4 above, and further in view of Sabsabi '897.

With regard to Claim 13, Singh et al. in view of Koester et al. and Elings et al., and further in view of Sabsabi '289, disclose the invention as set forth above in Claims 1 and 4, except for the pulsed laser source emitting ultraviolet light. However, Sabsabi '897 teaches the source emitting ultraviolet light (See col. 7, lines 10-11). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the pulsed laser source of Singh et al. in view of Koester et al. and Elings et al., and further in view of Sabsabi '289 to be ultraviolet as taught by Sabsabi '897 to effectively penetrate for a longer period the developing plasma and reach the target surface for maximum laser ablation (See col. 6, lines 51-61).

19. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Singh et al. in view of Koester et al. and Elings et al., and further in view of Sabsabi '897 as applied to Claims 1 and 5 above, and further in view of Magee et al.

Singh et al. in view of Koester et al. and Elings et al., and further in view of Sabsabi '897, disclose the invention as set forth above in Claims 1 and 5, except for the relative variation of energy between laser pulses does not exceed 5%. However, Magee et al. discloses the relative variation of energy between laser pulses not exceeding 5% (See col.

7, lines 63-65). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the laser of Singh et al. in view of Koester et al. and Elings et al., and further in view of Sabsabi '897, to have the energy variation as taught by Magee et al. to have a more consistent quality of analysis.

20. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Singh et al. in view of Koester et al. and Elings et al., and further in view of Ferguson et al., as applied to Claims 1, 7-8 above, and further in view of Andre et al.

Singh et al. in view of Koester et al. and Elings et al., and further in view of Ferguson et al., discloses the invention as set forth above in Claims 1, 7-8, except for a means for blowing a gas jet onto the object. However, Andre et al. teaches a means for blowing a gas jet onto the object (See col. 2, lines 55-67). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the elementary analysis device of Singh et al. in view of Koester et al. and Elings et al., and further in view of Ferguson et al., to include a means for blowing a gas jet onto the object as taught by Andre et al. to create more favorable conditions for spectral analysis (See col. 2, lines 60-62).

21. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Singh et al. in view of Koester et al. and Elings et al., and further in view of Andre et al. as applied to Claims 1 and 9 above, and further in view of Svanberg et al.

Singh et al. in view of Koester et al. and Elings et al., and further in view of Andre et al., discloses the invention as set forth above. Additionally, Singh et al. in view of Koester et al. and Elings et al., and further in view of Andre et al., discloses a mirror (See

4 of Figure 1 of Singh et al.) reflecting at the wavelength of the laser source and transparent at other wavelengths (See col. 6, lines 42-47 of Singh et al.), and the mirror being placed on the light path between the first and second optical means and designed to reflect almost the entire laser beam to the second optical means and to transmit an image of the object to the observation means (See 10 in Figure 1 of Singh et al.). Singh et al. in view of Koester et al. and Elings et al., and further in view of Andre et al., lacks a means for observing the object, so that the object can be placed in the image plane of the diaphragm. However, Svanberg et al. teaches a means for observing the object (See Figure 1; col. 2, lines 57-68) in the image plane (See 4 in Figure 1). In the combination of Singh et al. in view of Koester et al. and Elings et al., and further in view of Andre et al., and further in view of Svanberg et al., the image plane of the diaphragm would be in the image plane (See 4 in Figure 1). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Singh et al. in view of Koester et al. and Elings et al., and further in view of Andre et al., to include a means for observing the object to ensure correct placement of the object for analysis.

Conclusion

22. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

23. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arnel C. Lavarias whose telephone number is 703-305-4007. The examiner can normally be reached on M-F 8:30 AM - 5 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Drew Dunn can be reached on 703-305-0024. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1782.

Arnel C. Lavarias
July 1, 2003

Thong Nguyen
Primary Examiner